

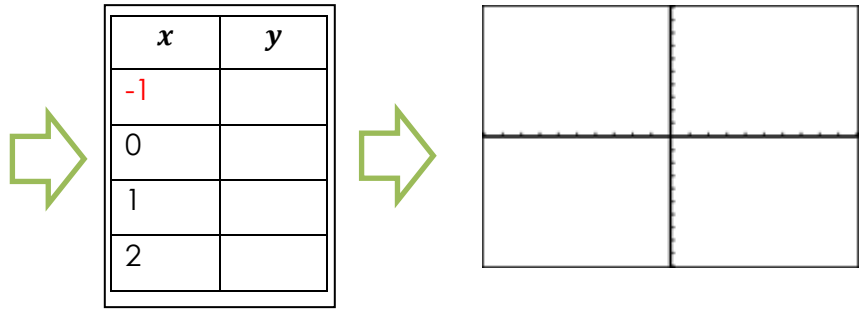
## 9.2 Notes – Linear vs. Nonlinear Functions

I CAN...

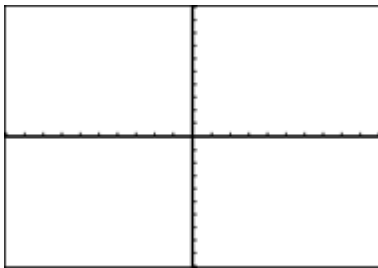
- Determine** if a relationship is linear or nonlinear from a table, graph, equation, or verbal description.
- Give** examples of nonlinear functions.

Function 1:  $y = -3x + 5$

$y = -3(-1) + 5$

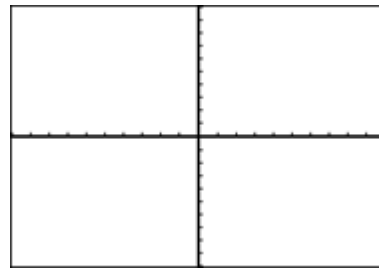


Function 2:  $y = x^3 + 1$



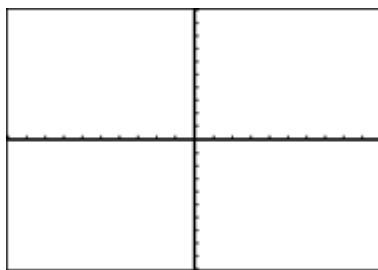
$x$	$y$

Function 3:  $y = x^2 - 2$



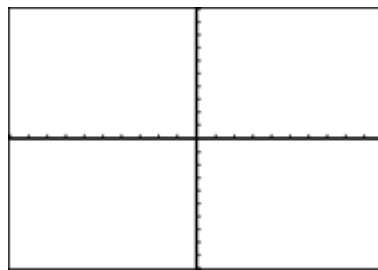
$x$	$y$

Function 4:  $y = \frac{2}{5}x$



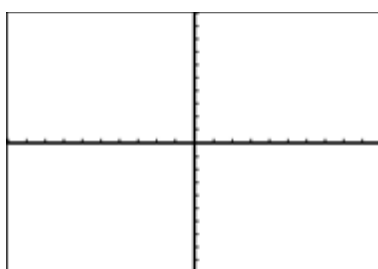
$x$	$y$

Function 5:  $y = -3$



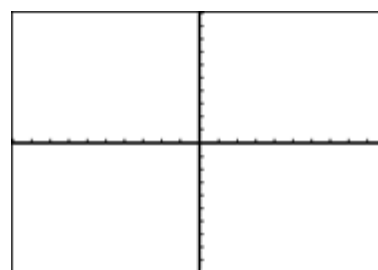
$x$	$y$

Function 6:  $y = -3x^2$



$x$	$y$

Function 7:  $y = \frac{1}{x}$



$x$	$y$

# Linear Functions

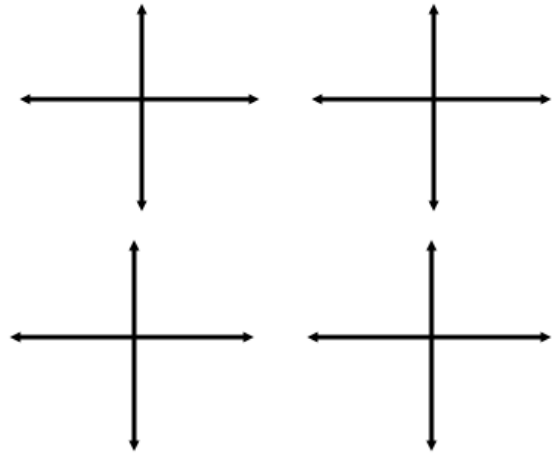
Equation:  $y = mx + b$

$$y = \frac{\quad}{\text{(slope)}} x + \frac{\quad}{\text{(y-intercept)}}$$

Graph: \_\_\_\_\_ Line

Table:

x	-3	-2	-1	0	1	2	3
y	-3	-1	1	3	5	7	9



How do you know if a linear EQUATION is increasing or decreasing?

How do you know if a linear GRAPH is increasing or decreasing?

Determine if the equation is linear, or nonlinear (tell how you know). If it is linear, is it increasing or decreasing (tell how you know)?

1)  $y = \frac{1}{3}x + 3$

Linear or nonlinear... why?

Increasing or decreasing... why?

2)  $y = \frac{1}{4}(3)^x$

Linear or nonlinear... why?

Increasing or decreasing... why?

3)  $y = x^2 + 3x + 1$

Linear or nonlinear... why?

Increasing or decreasing... why?

4)  $y = \frac{3}{x}$

Linear or nonlinear... why?

Increasing or decreasing... why?

5)  $y = \frac{x}{3}$

Linear or nonlinear... why?

Increasing or decreasing... why?

6)  $y = x$

Linear or nonlinear... why?

Increasing or decreasing... why?

7)  $y = x^3 + x^2 + 1$

Linear or nonlinear... why?

Increasing or decreasing... why?

8)  $y = 1$

Linear or nonlinear... why?

Increasing or decreasing... why?

9)  $y = x^2$

Linear or nonlinear... why?

Increasing or decreasing... why?

**Tell whether the table represents a linear or nonlinear function. If it is linear, is it increasing or decreasing?**

10) 

<b>x</b>	-3	-2	-1	0	1
<b>y</b>	-7	-5	-3	-1	1

11) 

<b>x</b>	-2	-1	0	1	2
<b>y</b>	2	0.5	0	0.5	2

12) 

<b>x</b>	-2	-1	0	1	2
<b>y</b>	8	2	0	2	8

13) 

<b>x</b>	-1	0	1	2
<b>y</b>	6	2	$\frac{2}{3}$	$\frac{2}{9}$

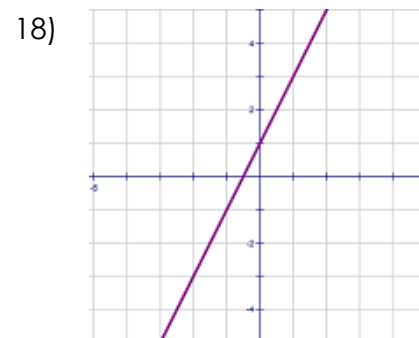
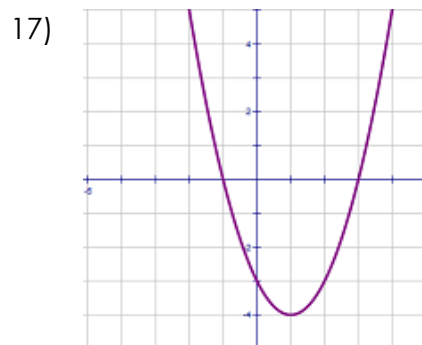
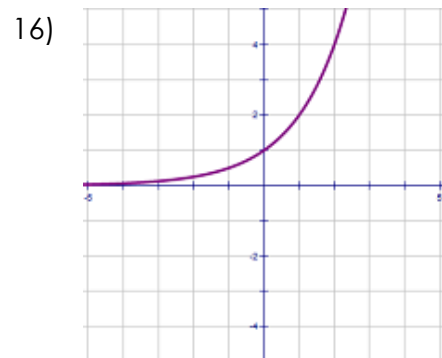
14) 

<b>x</b>	-2	-1	0	1	2
<b>y</b>	$\frac{2}{9}$	$\frac{2}{3}$	2	6	18

15) 

<b>x</b>	-2	-1	0	1	2
<b>y</b>	-4	-1	2	5	8

**Determine if the graph is linear or nonlinear. If it is linear, is it increasing or decreasing?**



**SCORE:**

\_\_\_\_ / 22

\_\_\_\_ %

Name \_\_\_\_\_ Period \_\_\_\_\_

**9.2 HW**

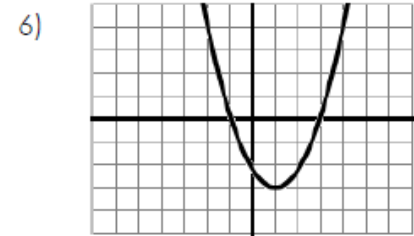
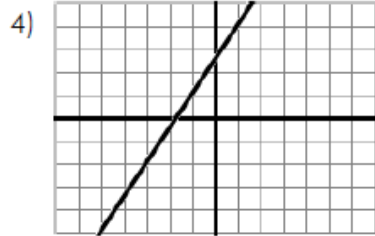
You also need to finish the examples problems on your notes that we skipped.

Tell whether the equation, graph, or table shows a linear or nonlinear function. If it is linear, is it increasing or decreasing? Remember to explain your answers.

1)  $y = 3 - 4x^2$

2)  $y = 4x - 6$

3)  $y = 1.05^x$

7) 

x	y
-2	0.111
-1	0.333
0	1
1	3
2	9

8) 

x	y
-2	7
-1	2
0	-1
1	-2
2	-1

9) 

x	y
-2	-2
-1	1
0	4
1	7
2	10

10) Give an example of the graph, table and equation of a nonlinear function.

## Review of 8.5

Read the directions for the puzzle sheet carefully. You must show all work on a sheet of notebook paper (neatly and numbered) AND complete the puzzle. Your puzzle should make sense, if it doesn't you will need to fix a few of the questions. (1/2 point each)

# What Do Biologists Do When They Visit France?



Solve each formula for the indicated variable. Circle the letter next to your answer.

Write this letter in the box at the bottom of the page containing the exercise number.



$d = rt$ , for $r$ <b>E</b> $r = \frac{d}{t}$ <b>M</b> $r = \frac{t}{d}$ <b>1</b>	$B = T - Lc$ , for $T$ <b>V</b> $T = \frac{B}{Lc}$ <b>O</b> $T = B + Lc$ <b>2</b>	$S = 2\pi rh$ , for $h$ <b>L</b> $h = \frac{2\pi S}{r}$ <b>I</b> $h = \frac{S}{2\pi r}$ <b>3</b>	$E = mc^2$ , for $m$ <b>A</b> $m = \frac{E}{c^2}$ <b>W</b> $m = \frac{c^2}{E}$ <b>4</b>	$A = \frac{bh}{2}$ , for $b$ <b>S</b> $b = \frac{Ah}{2}$ <b>T</b> $b = \frac{2A}{h}$ <b>5</b>															
$y = mx + b$ , for $b$ <b>T</b> $b = \frac{mx}{y}$ <b>N</b> $b = y - mx$ <b>6</b>	$y = mx + b$ , for $x$ <b>G</b> $x = \frac{y - b}{m}$ <b>I</b> $x = \frac{y - b}{m}$ <b>7</b>	$I = \frac{E}{R}$ , for $E$ <b>E</b> $E = IR$ <b>I</b> $E = \frac{I}{R}$ <b>8</b>	$V = \pi r^2 h$ , for $h$ <b>T</b> $h = \frac{\pi V}{r^2}$ <b>G</b> $h = \frac{V}{\pi r^2}$ <b>9</b>	$T = p + prt$ , for $r$ <b>A</b> $r = \frac{T - p}{pt}$ <b>K</b> $r = \frac{T - pt}{t}$ <b>10</b>															
$A = \frac{\pi r^2 S}{360}$ , for $S$ <b>E</b> $S = \frac{360A}{\pi r^2}$ <b>F</b> $S = \frac{360}{\pi r^2 A}$ <b>11</b>	$p = 2l + 2w$ , for $w$ <b>N</b> $w = \frac{p + l}{2}$ <b>Y</b> $w = \frac{p - 2l}{2}$ <b>12</b>	$V = \frac{1}{3} Bh$ , for $h$ <b>P</b> $h = 3VB$ <b>S</b> $h = \frac{3V}{B}$ <b>13</b>	$P = a + (n - 1)b$ , for $b$ <b>H</b> $b = \frac{P - a}{n - 1}$ <b>R</b> $b = \frac{(n - 1)a}{P}$ <b>14</b>	$h = vt - 16t^2$ , for $v$ <b>S</b> $v = \frac{h + 16t^2}{t}$ <b>B</b> $v = \frac{16t^2 - h}{t}$ <b>15</b>															
$m = \frac{2E}{v^2}$ , for $E$ <b>L</b> $E = 2mv^2$ <b>G</b> $E = \frac{mv^2}{2}$ <b>16</b>	$A = \frac{a + b + c}{3}$ , for $c$ <b>N</b> $c = \frac{3A}{a + b}$ <b>T</b> $c = 3A - a - b$ <b>17</b>	$S = \frac{1}{2} at^2$ , for $t^2$ <b>P</b> $t^2 = \frac{2S}{a}$ <b>F</b> $t^2 = \frac{2a}{S}$ <b>18</b>	$F = \frac{9}{5} C + 32$ , for $C$ <b>T</b> $C = \frac{5}{9} F + 32$ <b>E</b> $C = \frac{5}{9} (F - 32)$ <b>19</b>	$V = \frac{4}{3} \pi r^3$ , for $r^3$ <b>R</b> $r^3 = \frac{3V}{4\pi}$ <b>D</b> $r^3 = \frac{4V\pi}{3}$ <b>20</b>															
5	14	8	12	16	2	18	10	20	4	13	7	17	1	15	11	19	3	6	9